



Tetra Tech EM Inc.

**SOIL AND VEGETATION CONDITIONS AT THE
GROUNDHOG MINE RECLAMATION AREA**

Prepared for:

**Chino Mines Company
Hurley, New Mexico**

Prepared by:

**Tetra Tech EMI
6121 Indian School Road, Suite 205
Albuquerque, NM 87110**

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1.0 INTRODUCTION

Tetra Tech EM Inc. conducted an investigation of the soils and vegetation on the reclaimed Groundhog mine site in Grant County, New Mexico (Figure 1, in Golder, 2000). The Groundhog mine area is within the Hanover/Whitewater Creeks Investigation Units. The investigation was conducted partially in response to the Conditional Approval Letter received by Chino Mines Company (Chino) from the New Mexico Environment Department (NMED) on January 27, 2000.

The Groundhog stockpiles were covered and seeded in 1992 and 1993 by the previous owner. In 1994, additional activities were conducted in some areas to reclaim materials moved from the Denver and Lucky Bill shaft areas. Reconnaissance of the Groundhog site indicates that the majority of the area with intact soil covers is well vegetated. The Administrative Order on Consent (AOC) Community Work Group requested that the vegetation and underlying soils be characterized to support the development of voluntary remedial options for the area. The primary objectives of the investigation were to determine the vegetation cover levels and chemical and physical characteristics of the underlying soil materials. This investigation is expected to aid in the resolution of issues concerning adequate soil cover thickness for the development of a self-sustaining ecosystem.

This study was conducted concurrently with a detailed investigation of the Groundhog Mine by Golder Associates (Golder, 2000). The investigation of the soil and vegetation condition is included as an attachment to the Golder report and the figures referred to herein can be found in the Golder report.

3.0 RESULTS

Results of the field and laboratory studies are described in the sections 3.1 (vegetation) and 3.2 (soils).

3.1 VEGETATION

A site-wide vegetation survey of the Groundhog property conducted in February 2000 revealed a variety of grasses (21 species), forbs (29 species), and shrubs, trees, and cactus (9 species) growing on the reclaimed areas. The plants identified during the February 2000 survey are listed in Tables 2, 3, and 4.

Table 2. Shrubs, trees, and cacti identified on the Groundhog reclamation site

Common Name	Scientific Name
Tarragon	<i>Artemesia dracunculus</i>
California bricklebush	<i>Brickellia californica</i>
Broom snakeweed	<i>Gutierrezia sarothrae</i>
Alligator juniper	<i>Juniperus deppeana</i>
Tree cholla	<i>Opuntia imbricata</i>
Fremont's cottonwood	<i>Populus fremontii</i>
Honey mesquite	<i>Prosopis glandulosa</i>
Emory oak	<i>Quercus emoryii</i>
Soaptree yucca	<i>Yucca elata</i>

Table 3. Grasses identified on the Groundhog reclamation site

Common Name	Scientific Name
Six weeks threeawn	<i>Aristida adscensionis</i>
Poverty threeawn	<i>Aristida divaricata</i>
Single threeawn	<i>Aristida orcuttiana</i>
Purple threeawn	<i>Aristida purpurea</i>
Six weeks grama	<i>Bouteloa barbata</i>
Cane bluestem	<i>Bothriochloa barbinodis</i>
Black grama	<i>Bouteloua eriopoda</i>
Yellow bluestem	<i>Bothriochloa ischaemum</i>
Sideoats grama	<i>Bouteloua curtipendula</i>
Blue grama	<i>Bouteloua gracilis</i>
Hairy grama	<i>Bouteloua hirsuta</i>
Feather fingergrass	<i>Chloris virgata</i>
Weeping lovegrass	<i>Eragrostis curvula</i>
Stinkgrass	<i>Eragrostis cilianensis</i>
Low woollygrass	<i>Erioneuron pulchellum</i>
Curleymesquite	<i>Hilaria belangeri</i>
Hall's panicum	<i>Panicum hallii</i>
Streambed bristlegrass	<i>Setaria leucopila</i>
Sand dropseed	<i>Sporobolus cryptandrus</i>
Mesa dropseed	<i>Sporobolus flexuosus</i>
Bottlebrush squirreltail	<i>Sitanion hystrix</i>

Table 4. Forbs identified on the Groundhog reclamation site.

Common Name	Scientific Name
Wooly milkvetch	<i>Astragalus mollissimus</i>
Dwarf stickpea	<i>Calliandra humilus</i>
Thymeleaf sandmat	<i>Chamaesyce serpyllifolia</i>
Sonoran prairie clover	<i>Dalea filiformis</i>
Cooley's bundleflower	<i>Desmanthus cooleyi</i>
Rose's ticktrefoil	<i>Desmodium rosei</i>
Abert's eriogonum	<i>Eriogonum abertianum</i>
Red dome blanketflower	<i>Gaillardia pinnatifida</i>
Slender goldenweed	<i>Haplopappus gracilis</i>
Annual sunflower	<i>Helianthus annuus</i>
Showy goldeneye	<i>Heliomeris multiflora</i>
Wingpetal	<i>Heterospermum pinnatum</i>
Wrights thimblehead	<i>Hymenothrix wrightii</i>
Transpecos morning-glory	<i>Ipomoea cristulata</i>
Manyflowered gilia	<i>Ipomopsis multiflora</i>
Morning-glory	<i>Ipomoea sp.</i>
Tanseyleaf aster	<i>Machaeranthera tanacetifolia</i>
Horehound	<i>Marrubium vulgare</i>
Dwarf mentzelia	<i>Mentzelia pumila</i>
Rough menodora	<i>Menodora scabra</i>
Beardlip penstemon	<i>Penstemon barbatus</i>
Fivebract cinchweed	<i>Pectis filipes</i>
Pigweed	PHYSALIS sp.
Coneflower	<i>Ratibida tagetes</i>
Russian thistle	<i>Salsola iberica</i>
Sage	SALVIA sp.
Douglas' groundsel	<i>Senecio douglasii</i>
Silverleaf nightshade	<i>Solanum eleagnifolium</i>
Scarlet globemallow	<i>Sphaeralcea coccinea</i>